Warrell Creek to Nambucca Heads – Pacific Highway Upgrade Project

ENVIRONMENT PROTECTION AUTHORITY MONTHLY REPORT

- September 2015

Pacifico Project Number: WC2NH

A team consisting of RMS and Pacifico (ACCIONA Ferrovial JV)
to upgrade the Pacific Highway at Warrell Creek to Nambucca Heads

Contents

1. Introduction

Environmental Protection Licence (EPL) 20533 was issued to ACCIONA Infrastructure for the Warrell Creek to Nambucca Heads Pacific Highway Upgrade project on the 16th December 2014. Condition R1.8 of the EPL requires the licensee to provide the EPA with a monthly report containing the following information:

a) details of all non-compliances with the conditions of this licence and measures taken, or proposed, to prevent a recurrence of such a non-compliance; and
b) details of all discharges from the sediment basins where the water quality results exceed the limits prescribed by Condition L2.4 including the results of rainfall measurements to demonstrate compliance with Condition M4.1; and

The report referred to in this condition must be received by the EPA within 10 working days of the end of each month.

This document has been prepared to fulfil the requirements of Condition R1.8.

1.1 Description of Works

The project's construction activities during September 2015 were limited to the following:

- Clearing and Grubbing;
- Topsoil stripping;
- Earthworks including crushing;
- Production blasting;
- Commencement of piling including driven piling;
- Continuing bridge works including temporary work platforms;
- Earthworks through the flying fox area;
- Installation of erosion and sediment controls;
- Installation of permanent boundary fencing;
- Installation of monitoring instruments – extensometers, inclinometers and piezometers;
- Continuing culvert installation;
- Site compound establishment (Northern Compound);
- Geotechnical Investigations;
- Installation of temporary waterway crossings; and
- Site Survey.

The works scheduled for next month include:

- Clearing and Grubbing;
- Topsoil stripping;
- Earthworks including crushing;
- Production blasting;
- Commencement of piling including driven piling;
- Continuing bridge works including temporary work platforms;
- Earthworks through the flying fox area;
- Installation of erosion and sediment controls;
- Installation of permanent boundary fencing;
- Installation of monitoring instruments – extensometers, inclinometers and piezometers

- Continuing culvert installation;
- Site compound establishment (Northern Compound);
- Geotechnical Investigations;
- Installation of temporary waterway crossings; and
- Site Survey.
- Williamson Creek Realignment

1.2 Consultation Activities

The project's consultation activities during September 2015 included various community letterbox drop notifications and the following:

Groups	Date	Key Topics
Environmental Review Group	15/09/15	Construction Progress, Design Update, Upcoming works, EWMS discussion, Environmental Update, Monitoring update.

Other consultation activities:

- Consultation for the construction of crib sheds at Northern Compound.
- Consultation with Old Coast Road residents re: the new alignment of Old Coast Road
- Ongoing weekly consultation with sensitive receivers in Cut 11 re: blasting and any feedback.
- Consultation with sensitive receivers regarding the installation of first flush water tank systems
- Ongoing consultation with sensitive receivers in Cut 10 re: blasting activities
- Community Information Sessions 16th and 17th September – ramps, flooding, noise and dust and a general project update featuring the bridge work, piling, batch plant, precast facility and earthworks

At House Noise Treatments

The At House noise treatment program is currently being managed by RMS and is not part of the ACCIONA (Pacifico) Scope of Works and Technical Criteria.

Upcoming Community and stakeholder activities for 2015:

- Community Information Sessions are currently scheduled for November 2015 for design refinements and Urban Design and Landscaping (UD01), including drop in sessions.

2. Weather

2.1 Discussion

The automatic recording weather station at the main site compounds (north and south) records rainfall totals daily at 9AM. The total rainfall received for the month is as follows:-

Month	Total monthly rainfall	Location
01/09/15 – 30/09/15	108.4mm	Northern Compound
01/09/15 – 30/09/15	95.8mm	Albert Drive Compound

The site experienced a total of 15 rain days throughout the month of September 2015.

During September, rainfall received on site was higher than the September monthly average of 55.6mm. A summary of weather conditions recorded over the month for Smoky Cape by the Bureau of Meteorology is detailed below in Table 2.3.

The daily summaries for rainfall received in September at the Albert Drive compound and Northern Compound are shown below in Table 2.1 and 2.2.

Table 2.1 – Rainfall recorded at Albert Drive compound automated weather station

Site Name: Southern Compound		
Date	Time	TOTAL Rain Gauge
1/09/2015	9:00:00	0
2/09/2015	9:00:00	0
3/09/2015	9:00:00	0.8
4/09/2015	9:00:00	0
5/09/2015	9:00:00	1.4
6/09/2015	9:00:00	0.4
7/09/2015	9:00:00	1.2
8/09/2015	9:00:00	0.2
9/09/2015	9:00:00	0
10/09/2015	9:00:00	0
11/09/2015	9:00:00	0
12/09/2015	9:00:00	0
13/09/2015	9:00:00	0
14/09/2015	9:00:00	0
15/09/2015	9:00:00	0
16/09/2015	9:00:00	0.6
17/09/2015	9:00:00	1.4
18/09/2015	9:00:00	55.2
19/09/2015	9:00:00	3.6
20/09/2015	9:00:00	6.8
21/09/2015	9:00:00	3.2
22/09/2015	9:00:00	1
23/09/2015	9:00:00	0.6
24/09/2015	9:00:00	0

25/09/2015	9:00:00	3.6
26/09/2015	9:00:00	15.8
27/09/2015	9:00:00	0
28/09/2015	9:00:00	0
29/09/2015	9:00:00	0
30/09/2015	9:00:00	0

Table 2.2 – Rainfall recorded at the Northern compound automated weather station

SiteName: Northern Compound		
Date	Time	TOTAL Rain Gauge
1/09/2015	9:00:00	0
2/09/2015	9:00:00	0
3/09/2015	9:00:00	2.6
4/09/2015	9:00:00	0
5/09/2015	9:00:00	0
6/09/2015	9:00:00	0.2
7/09/2015	9:00:00	0.4
8/09/2015	9:00:00	0
9/09/2015	9:00:00	0
10/09/2015	9:00:00	0
11/09/2015	9:00:00	0
12/09/2015	9:00:00	0
13/09/2015	9:00:00	0
14/09/2015	9:00:00	0
15/09/2015	9:00:00	0
16/09/2015	9:00:00	0.2
17/09/2015	9:00:00	11
18/09/2015	9:00:00	59.6
19/09/2015	9:00:00	3.6
20/09/2015	9:00:00	11.4
21/09/2015	9:00:00	5
22/09/2015	9:00:00	0.2
23/09/2015	9:00:00	0
24/09/2015	9:00:00	0
25/09/2015	9:00:00	0.4
26/09/2015	9:00:00	13.6
27/09/2015	9:00:00	0
28/09/2015	9:00:00	0.2
29/09/2015	9:00:00	0
30/09/2015	9:00:00	0

Table 2.3: Weather conditions recorded in September 2015 at Smoky Cape by the Bureau of Meteorology.

Observations from Smoky Cape Lighthouse.

Smoky Cape Daily Summaries

SEPTEMBER 2015

Date	Minimum temperature (°C)	Maximum temperature (°C)	Rainfall (mm)
1/09/2015	12.9	21.9	0
2/09/2015	13.3	21.3	0
3/09/2015	12	23.3	2
4/09/2015	13.5	21.8	0
5/09/2015	12.6	22.3	2
6/09/2015	12.4	20.4	20
7/09/2015	15	22.7	0
8/09/2015	13.9	22.4	0
9/09/2015	13.2	22.3	0
10/09/2015	12.7	21.3	0
11/09/2015	12.7	21.3	1
12/09/2015	14	23.2	0
13/09/2015	14.3	24.2	0
14/09/2015	15.2	23.3	0
15/09/2015	16	23	0
16/09/2015	16.5	25.3	0
17/09/2015	16.1	22	1.2
18/09/2015	11.5	20.8	42.6
19/09/2015	11.9	20.9	11.2
20/09/2015	12.2	20.1	22.4
21/09/2015	13.9	21.9	0.8
22/09/2015	14.9	25	1
23/09/2015	10.5	17.3	0.6
24/09/2015	9.1	18.1	0.2
25/09/2015	10.1	17	4.6
26/09/2015	11.1	19.6	89
27/09/2015	11.9	21.2	0.8
28/09/2015	12.8	23.2	0
29/09/2015	13.5	24.2	0
30/09/2015	16.4	25.1	0

3. Surface Water Monitoring

Pacifico are awaiting trigger levels for baseline monitoring from RMS, so comparisons will be made to ANZECC guidelines and between upstream and downstream levels to determine site works impact.

Monthly sampling was undertaken by ACCIONA (Pacifico):

Wet Sampling Event

On the 18th September after >10mm of rainfall within a 24 hour period, field tests and lab samples were taken. The results are available in Appendix A.

Below exceedances are discussed:

Dissolved oxygen (DO) levels noted to be below ANZECC criteria at:

- Gumma Wetlands upstream and downstream, this is attributed to the low-flow environment of the water as well as vegetative matter decomposing within the water body.
- Upper Warrell Creek upstream and downstream, this is attributed to the low-flow environment in addition to the vegetative matter present in the water body.
- Stony Creek downstream, this is attributed to additional vegetative matter (leaves) observed decomposing in the water body at the downstream water quality monitoring location.

The low dissolved oxygen levels are consistent with baseline water quality data collected by RMS prior to the commencement of construction activities at the locations noted above.

Turbidity levels noted to be outside of ANZECC criteria at:

A high turbidity reading was recorded at all 3 Gumma Wetland sites, both upstream and downstream (123, 614 NTU upstream, 57.2 NTU downstream)

Gumma wetlands has variable background readings ranging from 2.4 – 951 NTUs, the recent rainfall has most likely contributed to the elevated turbidity. It is also noted that turbidity was much higher upstream compared with downstream from the site.

Metals levels noted to be outside of ANZECC criteria at:

Aluminium was elevated above ANZECC criteria at all freshwater sites both upstream and downstream (Upper Warrell Creek, Stony Creek, Lower Warrell Creek and Gumma Wetlands). It is noted that aluminium was not measured as part of baseline monitoring.

Copper was elevated above ANZECC criteria at all freshwater sites with the exception of Upper Warrell Creek upstream and Lower Warrell Creek upstream.

Zinc was also elevated at all freshwater sites both upstream and downstream, with the exception of Upper Warrell upstream and Stony Creek upstream.

Gumma wetland East upstream also had elevated cadmium, chromium, lead, manganese and nickel.

It is noted that Manganese was not measured in the baseline monitoring stage. One potential cause for the increase in elevated metals at these sites is the runoff as a result of rainfall.

Elevated zinc levels were also recorded at Upper Warrell Creek downstream (0.009mg/L) which is within baseline monitoring results of <0.005mg/L to 0.02mg/L.

Nutrient levels noted to be outside of ANZECC criteria at:

Elevated total phosphorus levels were recorded at Gumma East upstream, Gumma North downstream and Nambucca River South upstream.

Elevated total nitrogen levels were recorded at all sites excluding Nambucca River downstream (using trigger values from Table 8.2.2.1 Volume 2 of ANZECC water quality guidelines, as there is no value provided in the standard ANZECC 95% trigger levels for Total Nitrogen). These results are within baseline monitoring results.

Dry Sampling Event

A “dry” sampling event was undertaken on the 29th and 30th September, field tests were undertaken. The results are available in Appendix A.

Dissolved oxygen (DO) levels noted to be below ANZECC criteria at:

Upper Warrell Creek, both upstream and downstream. This is attributed to the low-flow of the river and reduced levels, as well as decomposing vegetative matter in the waterbody.

All Gumma Wetland sites, both upstream and downstream. This is attributed to the high amount of decomposing vegetative matter in the water as well as the stagnant wetlands waterbody.

pH levels noted to be below ANZECC criteria at:

All Gumma sites except Gumma Wetland upstream. This was within baseline levels. Upper Warrell Creek upstream also had a low pH level (6.39), also within baseline levels.

Turbidity levels noted to be outside of ANZECC criteria at:

A high turbidity reading was recorded at all Gumma Wetland sites. Gumma wetlands has variable background readings ranging from 2.4 – 951 NTUs. The tannins from vegetative matter may have influenced these results.

Nambucca River upstream and downstream also had elevated turbidity readings, this is likely due to the disturbance of sediment caused by tidal movements.

4. Sediment Basin Water Monitoring

Water was released from commissioned sediment basins between the 8th and 30th September after rainfall and water being transferred into basins from nearby waterways. Water pumped into basins was treated and released as soon as possible, especially if rainfall is predicted in the 5 day forecast. Table 4 below has the water quality results recorded for the water release events:

Table 4 – Water Release Register

Date	Basin ID	Oil and Grease (visible)	pH	Turbidity (NTU)	TSS (mg/L)	Approx Volume Discharged (kL)	Comments
8/09/15	B42.87	N	7.72	3.8			
8/09/15	B44.44	N	7.35	12.8		50	Water released pumped into basin from waterway works during extended dry period
9/09/15	B45.5	N	6.77	77.2		50	Water released pumped into basin from waterway works during extended dry period
22/09/15	B44.44	N	8.27	56	14	350	
22/09/15	B42.87	N	7.71	6	8	20	
22/09/15	B44.55	N	7.72	12	16	300	
22/09/15	B60.3	N	6.59	12	2.5	173	
22/09/15	B60.80	N	6.63	53.5	8	454	
22/09/15	B60.5	N	6.91	26.2	2.5	353	
23/09/15	B60.1	N	7.25	14	5.3	433	
23/09/15	B58.45	N	7.01	30.2	10	880	
23/09/15	B54.70	N	7.7	54.7		1459	
23/09/15	B59.60	N	7.99	56.7	12	703	Under construction - not yet commissioned
23/09/15	B55.17	N	7.7	3.9	2.5	348	
24/09/15	B54.3	N	7.96	0		447	
24/09/15	B42.87	N	8.18	6	8	400	
24/09/15	B59.78	N	7.61	0		658	
24/09/15	B46.35	N	8.08	0		400	
24/09/15	B59.85	N	8.12	45	5	812	
24/09/15	B47.14	N	8.32	7.2		400	
25/09/15	B55.50	N	7.62	26.7	28	493	Under construction - not yet commissioned
25/09/15	B56.5	N	7.71	13.6		410	Under construction - not yet commissioned
26/09/15	B45.64	N	6.57	13.8	16	450	
28/09/15	B60.3	N	7.24	72.9		140	

28/09/15	B59.78	N	6.51	0		450	
28/09/15	B56.7	N	6.72	21.8		40	Under construction - not yet commissioned
28/09/15	B45.5	N	7.61	16.4		800	
29/09/15	B60.5	N	7.51	0		245	
29/09/15	B45.5	N	6.76	11.6		1000	
30/09/15	B43.37	N	7.8	17		180	
30/09/15	B56.90	N	6.89	4.3		50	
30/09/15	B45.5	N	6.9	24.3		500	
30/09/15	B45.64	N	7.09	22.5		800	

- TSS is taken every third discharge on average
- Green = Water released from sediment trap

5. Noise Monitoring

Monthly routine construction noise monitoring was undertaken on the 9th, 21st and 28th September at eight locations near to construction works. Results from this are available in Appendix A.

All sites were within predicted levels for the activity being undertaken.

6. Vibration Monitoring

Vibration monitoring was undertaken on the 17th of September at the Ferry Punt on Nambucca River to verify minimal impacts to the structure from piling. PVS from piling had a maximum of 0.379mm/s, well within the allowable limit of 3mm/s (the allowable limit for Heritage Structures as per the NVMP).

6.1 Blasting

Three blasting events occurred in September 2015 – 7th, 17th and 25th of September 2015.

No exceedances occurred from these blasts.

There have been no exceedances for Overpressure from these three blasts, the highest recorded was 119.9dB on the 7th of September 2015.

We are required to achieve less than 5% exceedance (of 5mm/s limit) within a 12month period for those sensitive receptors that have not agreed to the 25mm/s limit. We have anticipated a total of 49 blasts. At the end of September our percentage is 11.1%.

7. Dust Monitoring

Dust deposition gauges (DDG) were placed at nearby sensitive receivers from the 10th August 2015 to 11th September 2015. DDG results are available in Appendix A.

An elevated level of 9g/m2/month total insoluble matter (TIM) was recorded at dust deposition gauge DDG5, Gumma Road (Ash Content 7.4g/m2/month).

An elevated level of 5.4g/m2/month TIM was recorded at DDG8, Old Coast Road (Ash content 4.5g/m2/month).

Surfactant additives have been procured for use on site in water carts and will be utilised as soon as they arrive (expected mid October 2015), based on the estimated delivery timeframe. Planning for an out of hours works request was also undertaken during the month of September for weekend watercart use, outside of standard construction hours to assist in reducing dust emission on the project.

To help mitigate fugitive dust emissions extra water carts have been utilised on site to dampen soil and the frequency of water cart visits increased at these locations during the month.

8. Groundwater Monitoring

ACCIONA (Pacifico) have undertaken groundwater monitoring on the 29/9/2015 and 30/9/2015. The results from the groundwater monitoring is available in Table 4 of Appendix A.

The groundwater monitoring results have been provided to RMS to provide advice on the trigger levels determined during the baseline sampling. The finalised groundwater report from the baseline sampling has not been issued from RMS to Pacifico including groundwater triggers.

9. Acoustic Investigations

No acoustic investigations were undertaken in September 2015.

10. Complaints

10.1 Summary of Complaints for the month

The following is a brief summary of environmental complaints received in September 2015.

On the 1st of September, a resident at Letitia Close called AFJV to enquire into the duration and program for piling activities at Nursery Road. The structures team provided a schedule for piling activities and provided this to all residents on Letitia Close with an invitation for feedback. Noise monitoring at Letitia Close, undertaken during piling activities in September 2015 did not identify any high noise generating activities above allowable limits.

On the 1st of September, a business owner on the Pacific Highway at Macksville contacted AFJV to discuss truck movements on the existing highway and the impact he believed that this was having on air quality. The community team obtained the program for truck movements on this section of the existing Pacific Highway (Macksville) and contacted the business owner to notify him that this construction activity associated with the additional truck on the highway was programmed for completion by the end of September 2015.

On the 3rd of September, a resident on O'Dell's Road contacted AFJV to raise a concern with a stockpile adjacent to the property which the resident stated was generating dust. A watercart was dispatched by the Southern Superintendent to undertake additional dust suppression at the stockpile location and the frequency of dust suppression increased at this location. No further complaints have been raised in relation to this stockpile.

On the 7th of September, a resident on Old Coast Road called AFJV to raise concerns of dust generation from the construction zone near the property. The Northern Superintendent was contacted and a water cart was dispatched to the location for dust suppression purposes. The frequency of dust suppression was also increased at this location. No further complaints have been raised by the resident in relation to dust generation at this location.

On the 8th of September, two residents on River Street, Macksville contacted the AFJV community team to raise concerns on dust generation, noise generation, diesel fumes and speed trucks. A watercart was dispatched by the Southern Superintendent to undertake additional dust suppression at this location and the frequency of dust suppression increased. Dust monitoring has been conducted at the residents property with the results (September 2014 DDG5) showing an exceedance of dust at this location during the monitoring period from 10th August – 9th September 2015 (Ash Content 7.4g/m2/month). The issue of diesel fumes and speeding was toolboxed to site personnel and the resident was encouraged to note the LV numbers of speeding plant. AFJV has procured surfactant additives to minimise dust and has identified areas that can be stabilised following the completion of pre-load in the near future including this location at Nambucca River Bridge Abutment during the settlement period. In addition no truck movements are anticipated for the month of October at this location as fill placement works are scheduled for completion and therefore this should result in a reduction of both plant on the local road network and dust generation from placement and haulage works.

On the 15th of September, a resident on Old Coast Road contacted the AFJV community team to advise of high levels of noise from the construction activities at the Abutment of the Nambucca River Bridge. A meeting was organised to discuss noise monitoring near the property and potential mitigation measures. At the meeting a AFJV Environmental Coordinator explained the process of noise monitoring and that the results from noise modelling to date were within NML's. An extension of the stockpile adjacent to the property was also discussed and is being followed up by the Northern Earthworks Team to provide additional screening from construction activities.

On the 28th of September, a resident on River Street contacted the community team about dust generation from construction activities and also to enquire about when at-house noise treatments were going to be completed at the property. The resident was advised that truck movements at this location would be reduced as the earthworks program would be completed at this location at the end of September 2015. A watercart was also sent to the location to undertake dust suppression and the frequency of dust suppression was also increased at this location. The resident was also advised on the status of the at-house noise treatments, managed by RMS.

On the 30th September, a resident on Main Street, Donnellyville contacted the community team to discuss what dust mitigation measures were to be put in place over summer. The community team explained the mitigation measures in place including the upcoming use of soil binders and was notified of the community hotline number to notify the project of perceived dust levels in real time. Since the complaint an Out Of Hours water cart(s) are in use.

11. Non-Compliance

11.1 Summary of Non-compliances

One NCR was raised in September 2015: Albert Drive early clearing

Early clearing of 206m2 of predominately Camphor laurel, lantana and slash pines with some native regrowth she oaks and acacia species (outside of EPL, Project boundary and Vegetation Clearing limits)
Non-compliance with:
1) Project Approval MP 07_0112, Condition B31) b) (v).
2) RMS Specification G36, Clause 3.10.
3) RMS Specification G40, Clause 2.4.3. and 2.4.1
4) Pacifico Flora and Fauna Management Plan Table 5-1, FF6 and FF7.

ICAM identified root cause as:
Release of the pre IFC approved design to the plant and equipment GIS system prior to checking if that it is within the EPL boundary, project boundary, vegetation clearing limits and subsequent if required an File Note, MaCR or MiCR.

All remedial actions have been identified and actioned and are detailed in the attached ICAM report.

All correction actions have been identified and actioned and are detailed in the attached ICAM report.

The main corrective action involves the Management of Change Process whereby, any pre IFC or IFC drawings prior to release by the Survey Team to plant and equipment GIS system will require consultation with the PACIFICO Environmental Team to ensure it is within the EPL, project boundary and clearing limits. The positions responsible are the Senior Surveyor Earthworks and Senior Surveyor Structures.

Appendix A – Monitoring Results

Table 1a - Surface Water Sampling Results September – Wet

Location	Units	Levels of Concern		Upper Warrell Creek	Upper Warrell Creek	Stony Creek	Stony Creek	Lower Warrell Creek	Lower Warrell Creek	Unnamed Creek Gumma West	Unnamed Creek Gumma East	Unnamed Creek Gumma North	Nambucca River South	Nambucca River South
Type		ANZECC 2000 95% species protected		Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Upstream	Downstream	Upstream	Downstream
Freshwater / Estuarine				Freshwater	Freshwater	Freshwater	Freshwater	Freshwater	Freshwater	Freshwater	Freshwater	Freshwater	Estuarine	Estuarine
Date of Sampling				18-Sep-15	18-Sep-15	18-Sep-15	18-Sep-15	18-Sep-15	18-Sep-15	18-Sep-15	18-Sep-15	18-Sep-15	18-Sep-15	18-Sep-15
Time of Sampling		Freshwater	Marine	11:55 AM	11:47 AM	11:20 AM	11:30 AM	9:05 AM	9:11 AM	10:00 AM	10:15 AM	9:49 AM	8:30 AM	8:20 AM
Comments														
Laboratory data														
Metals														
Aluminium	mg/L	0.055	-	0.19	0.24	1.1	1.8	0.24	0.56	0.19	8.7	0.64	0.71	0.13
Arsenic	mg/L	0.024	0.0023	<0.001	<0.001	0.003	0.002	<0.001	<0.001	0.002	0.011	0.003	0.002	0.001
Cadmium	mg/L	0.0002	0.0055	<0.0001	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0003	<0.0001	<0.0001	<0.0001
Chromium	mg/L	0.001	0.0044	<0.001	<0.001	0.002	0.002	<0.001	<0.001	<0.001	0.013	0.002	0.001	<0.001
Copper	mg/L	0.0014	0.0013	<0.001	0.002	0.002	0.003	<0.001	0.002	0.002	0.029	0.002	0.004	0.003
Lead	mg/L	0.0034	0.0044	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.014	<0.001	<0.001	<0.001
Manganese	mg/L	1.9	0.08	0.168	0.19	0.096	0.134	0.239	0.247	0.424	2.61	0.9	0.068	0.051
Nickel	mg/L	0.011	0.07	<0.001	0.007	0.001	0.002	0.002	0.002	0.004	0.018	0.003	0.001	<0.001
Selenium	mg/L	11	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silver	mg/L	0.00005	0.0014	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	mg/L	0.008	0.015	<0.005	0.015	0.006	0.012	0.01	0.012	0.014	0.114	0.015	0.01	<0.005
Iron	mg/L	-	-	1.07	0.9	2.7	2.66	0.55	1.12	3.52	30.1	6.57	1.34	0.24
Mercury	mg/L	0.0006	0.0004	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Recoverable Hydrocarbons														
Naphthalene	µg/L	16	50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C6 - C10 Fraction	µg/L	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C6 - C10 Fraction minus BTEX (F1)	µg/L	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
>C10 - C16 Fraction	µg/L	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
>C16 - C34 Fraction	µg/L	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
>C34 - C40 Fraction	µg/L	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
>C10 - C40 Fraction (sum)	µg/L	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BTEX														
Benzene	µg/L	950	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	µg/L	180	180	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	µg/L	80	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
m&p-Xylenes	µg/L	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene	µg/L	350	350	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes - Total	µg/L	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sum of BTEX	µg/L	-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nutrients														
Total Phosphorus	mg/L	0.05	0.03	<0.03	<0.03	0.04	<0.03	<0.03	<0.03	<0.03	1.16	0.2	0.09	<0.03
Orthophosphate (reactive phosphorus)	mg/L	-	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Total Nitrogen	mg/L	0.5	0.3	0.67	0.59	0.99	0.59	0.66	0.59	1.32	30.2	2.82	0.79	0.29
Nitrate	mg/L	0.7	-	<0.05	0.05	<0.05	0.18	0.05	0.05	0.14	<0.05	<0.05	<0.05	<0.05
Nitrite	mg/L	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ammonia	mg/L	0.9	-	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	0.8	<0.05	<0.05	<0.05
TSS														
Turbidity		50	10	7.7	8.1	39	33	11	7.6	29	500	49	66	4.7
TSS	mg/L	<40	<10	12	10	69	22	18	7	16	2410	103	252	13
Field Physical data														
Temperature	°C	-	-	17.54	17.78	17.11	16.66	19.58	19.82	18.81	17.36	22.49	20.44	20.81
pH	pH	-	6.5-8	6.72	6.64	6.95	6.61	7.17	7.17	6.75	6.36	6.78	7.72	7.79
pHmV	pHmV	-	-	-31	-26	-43	-25	-56	-56	-32	-10	-34	-88	-92
ORPmV	ORPmV	-	-	209	205	145	186	142	133	45	44	-27	107	142
Conductivity	mS/cm	0.125-2.2	-	0.234	0.267	0.2	0.198	7.41	7.35	0.834	0.684	1.82	38.7	37.1
Turbidity	NTU	50	10	4.8	6.7	12.6	43	6.4	4.9	123	614	57.2	6.1	5
Dissolved Oxygen	mg/L	5	5	4.76	4.61	6.44	4.69	5.06	5.09	0.68	0	20.6	5.54	5.8
TDS	g/L	-	-	0.152	0.173	0.13	0.129	4.67	4.63	0.534	0.437	1.17	23.6	22.3

Table 1b – Surface Water Sampling Results September - Dry

Location	Units	Levels of Concern		Upper Warrell Creek	Upper Warrell Creek	Stony Creek	Stony Creek	Lower Warrell Creek	Lower Warrell Creek	Unnamed Creek Gumma West	Unnamed Creek Gumma East	Unnamed Creek Gumma North	Nambucca River South	Nambucca River South
Type		ANZECC 2000 95% species protected		Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Upstream	Downstream	Upstream	Downstream
Freshwater / Estuarine				Freshwater	Freshwater	Freshwater	Freshwater	Freshwater	Freshwater	Freshwater	Freshwater	Freshwater	Estuarine	Estuarine
Date of Sampling				30-Sep-15	30-Sep-15	29-Sep-15	29-Sep-15	30-Sep-15	30-Sep-15	30-Sep-15	30-Sep-15	30-Sep-15	30-Sep-15	30-Sep-15
Time of Sampling		Freshwater	Marine	2:10 PM	1:57 PM	12:20 PM	12:14 PM	3:00 PM	3:10 PM	4:44 PM	5:10 PM	5:00 PM	5:40 PM	5:30 PM
Comments														
Field Physical data														
Temperature	°C	-	-	16.5	20.83	16.83	17.58	21.63	20.23	20.96	18.11	19.15	20.21	20.74
pH	pH	-	6.5-8	6.39	6.52	7.34	7.03	6.62	7.12	6.35	6.18	6.63	7.5	7.02
pHmV	pHmV	-	-	17	11	-66	-48	5	10	21	30	5	-65	-17
ORPmV	ORPmV	-	-	-110	-142	131	113	25	110	-167	-258	-103	-100	-120
Conductivity	mS/cm	0.125-2.2	-	0.272	0.246	0.273	0.264	8.97	8.7	0.756	0.754	1.29	38.2	37.3
Turbidity	NTU	50	10	4	3.2	20.1	3.4	4.2	9.1	81.2	38.1	8.8	48.2	49.5
Dissolved Oxygen	mg/L	5	5	4.97	6.31	5.89	5.65	5.43	5.5	3.57	0.24	0.3	5.65	5.82
TDS	g/L	-	-	0.177	0.16	0.178	0.172	5.65	5.49	0.484	0.482	0.824	26.5	23.3

Taken from alternative trigger levels provided in ANZECC Water Guidelines Volume 1 and Volume 2 where insufficient data was available for 95%

Exceedances of ANZECC Level of Concern

Table 2 – Noise Monitoring Results September

Date	Time	Location	Rec ID	NCA	NML	Activity	Predicted levels for activity	LAeq	LAFMAX	LAFMIN	LCEQ	LAF05	LAF10	LAF50	LAF90	Principal sources/ operations	Measurements exceeding criteria, plant/ operations causing	Corrective actions	Notes
28/09/2015	12:38 PM	Albert Drive	74	1	50	Cut	62	54.8	66.7	47.4	77.4	59.4	44.5	42.2	55.5	Excavators, moxy			Within predicted levels
9/09/2015	3:00 PM	Cockburns Lane	16	1	50	Cut	65	50.6	65.9	43.2	65.2	54.1	52.6	49.4	47	Excavator tracking			Within predicted levels
28/09/2015	4:00 PM	Bald Hill Rd	197	3	50	Cut	72	60.1	82.8	46.3	73.1	64.1	59.3	52	49.2	Excavtors, moxy, dozer			Within predicted levels
21/09/2015	3:30 PM	Letitia Rd	410	4	59	Cut	60	47.9	68.7	41.6	62.9	51.4	50.1	46.8	44.5	Highway traffic			Background level
28/09/2015	1:59 PM	Mattick Rd	442	6	44	Cut	62	50.3	72.3	40.3	69.6	54.1	50.6	46.1	43.6	Excavtor loading moxy, water truck			Within predicted levels
28/09/2015	2:23 PM	Nursery Rd	415	4	59	N/A		55.3	74.4	48.3	65	52.6	56.4	53.3	51.1	Highway traffic			Background level
28/09/2015	1:26 PM	Wallace St	148	3	50	Cut	47	60	85.2	49.9	73.5	63.2	60	55	52.5				Background level, construction works not auditable (approximately 400m away)
28/09/2015	3:41 PM	Gumma Rd	383	3	50	Fill	66	65.9	85	52	78.7	72	67.6	59.6	55.9	Excavator, dozer, grader, truck+dog			Within predicted levels

Table 3 - Dust monitoring results August/ September

		Unit	Levels of Concern	LOR	DDG1	DDG2	DDG3	DDG4	DDG5	DDG6	DDG7	DDG8	DDG A1	DDG A2
DDG ID														
Jul-15	Start date of sampling				10/08/2015	10/08/2015	10/08/2015	10/08/2015	10/08/2015	10/08/2015	10/08/2015	10/08/2015	10/08/2015	10/08/2015
	Finish date of sampling				11/09/2015	11/09/2015	11/09/2015	11/09/2015	11/09/2015	11/09/2015	11/09/2015	11/09/2015	11/09/2015	11/09/2015
	Ash Content	g/m².month	N/A	0.1	0.3	0.7	2.7	1.1	7.4	1.4	0.6	4.5	----	----
		mg	N/A	1	6	13	50	20	139	26	11	84	----	----
	Combustible Matter	g/m².month	N/A	0.1	0.2	0.5	0.8	<0.1	1.6	6.5	0.4	0.9	----	----
		mg	N/A	1	3	9	16	<1	31	123	7	18	----	----
	Total Insoluble	g/m².month	4 or increase of 2	0.1	0.5	1.2	3.5	1.1	9	7.9	1	5.4	----	----
		mg	N/A	1	9	22	66	20	170	149	18	102	----	----
	Arsenic	mg/L	0.001	0.001	----	----	----	----	----	----	----	----	<0.001	<0.001
	Comments													

Table 4 – Groundwater Monitoring Results September 2015

Location	Units	Groundwater Investigation Levels (GILs) from Interpretive Report	4BH007	4BH008	4BH010	4BH011	4BH021	4BH022	4BH025	4BH026	4BH037	4BH038	1BH49	4BH057	4BH061	4BH062
Cut/Fill			Cut 4	Cut 4	Cut 6	Cut 6	Cut 11	Cut 11	Cut 12	Cut 12	Fill 15	Fill 15	Cut 17	Cut 17	Cut 26	Cut 26
Date of Sampling			29/09/2015	29/09/2015	29/09/2015	29/09/2015	29/09/2015	29/09/2015	30/09/2015	30/09/2015	30/09/2015	30/09/2015	29/09/2015	29/09/2015	29/09/2015	29/09/2015
Comments			DRY	DRY		DRY				DRY	Unable to sample (damaged)		Pungent water (egg)		Dry - no logger	Dry - no logger
Field Physical data		-														
Depth to standing water level from TOC	m	-	-	-	15.57	-	8.18	15.00	6.66	-	-	0.94	15.97	0.23	-	-
pH	pH	-	-	-	5.02	-	5.89	6.21	6.69	-	-	5.66	5.85	6.70	-	-
Conductivity	mS/cm	-	-	-	5.140	-	0.137	0.193	0.200	-	-	4.230	1.140	0.125	-	-
Temperature	○C	-	-	-	22.01	-	25.36	21.15	19.86	-	-	19.42	22.21	23.57	-	-
Dissolved Oxygen	mg/L	-	-	-	0.80	-	1.76	2.96	7.83	-	-	4.25	0.53	1.02	-	-
Turbidity	NTU	-	-	-	52.10	-	0.00	13.60	148.00	-	-	8.20	160.00	11.40	-	-